

## II. PRELIMINARY HYDROLOGICAL REPORT

By G. E. R. DEACON, F.R.S.

NATIONAL INSTITUTE OF OCEANOGRAPHY

The observations confirm the general picture of the water circulation described by A. F. Mohammed in *Proc. Roy. Soc. B.* **128**, 1939, and give some new information about the surface layer.

As plotted in Fig. 1, the surface water at Stations 30 and 31 in the Straits of Tiran, and at Station 23 twenty miles farther north on the east side of the gulf, had a salinity less than 40.6‰ which can be attributed to the inflow of water from the Red Sea. There is some indication that the inward movement has a greater influence on the east side of the gulf since the surface salinity at Station 17 nearly half-way up the gulf is only 40.63‰. For the remainder of the gulf, including all stations north and west of a line from Station 26 to Station 17, the water between the surface and 20 fathoms can be regarded as almost isothermal and isohaline, with a temperature of 21° to 22° C. (in January) and a salinity of 40.7 to 40.8‰.

Excepting Stations 31, 30, and 25, the observed surface temperature appears to depend more on the time of day at which the measurement was made than the position of the station in the gulf. When plotted against time of day (Fig. 2) the temperatures lie fairly closely about a curve of diurnal temperature change which has a maximum at approximately 13.00 hours. The bathythermograph observations made at all the stations always show a temperature less than that measured by taking a surface sample and using a thermometer. Some of the differences can be attributed to the shallower depth of the sample scooped up in a surface sampler, and to the existence of an appreciable thermal gradient in the first foot or two of water. The differences between the thermometer and bathythermograph readings when plotted against the time of day (Fig. 3) lie fairly closely about a curve with a maximum of 0.55° C., which is very similar to that showing the diurnal temperature variation (Fig. 2) at 13.00 hours. The differences between the readings at the surface and a depth of 40 metres on the bathythermograph slides (Fig. 4) shows that this difference, which varies between 0.2° and 0.6° C., varies according to a similar curve.

It is expected that some further information about the interchange of heat and water vapour between the surface water and the air can be obtained from the data, and, when some attempt is made to smooth out the diurnal temperature variations, one or two useful indications of the surface movements; but the best that can be done at present is to regard the upper 40 metres of water as more or less uniform, excepting Stations 31, 30, and 23. These appear to be influenced by the inflow of surface water from the Red Sea. Reference to Fig. 1 will also show that the stations near the eastern shore in the southern part of the gulf appear to be influenced by a more recent inflow of water than those farther north and west.

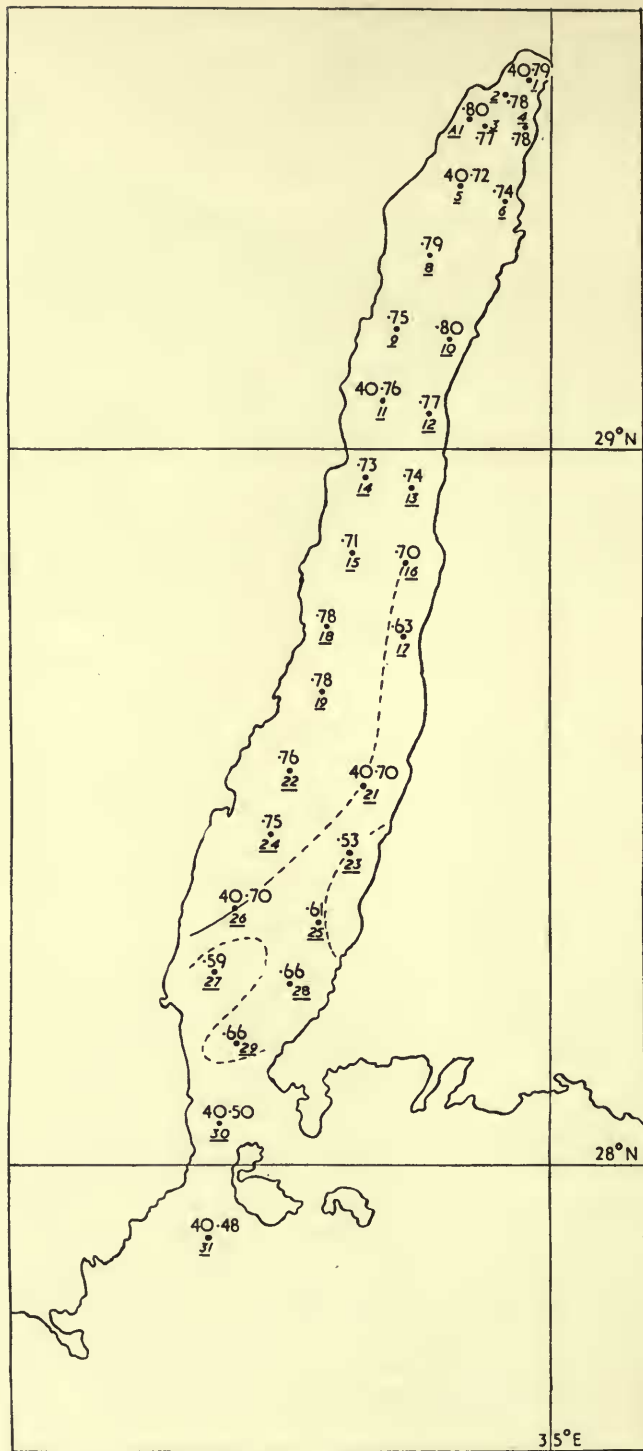


FIG. 1. Surface salinities. The underlined figures are the station numbers.

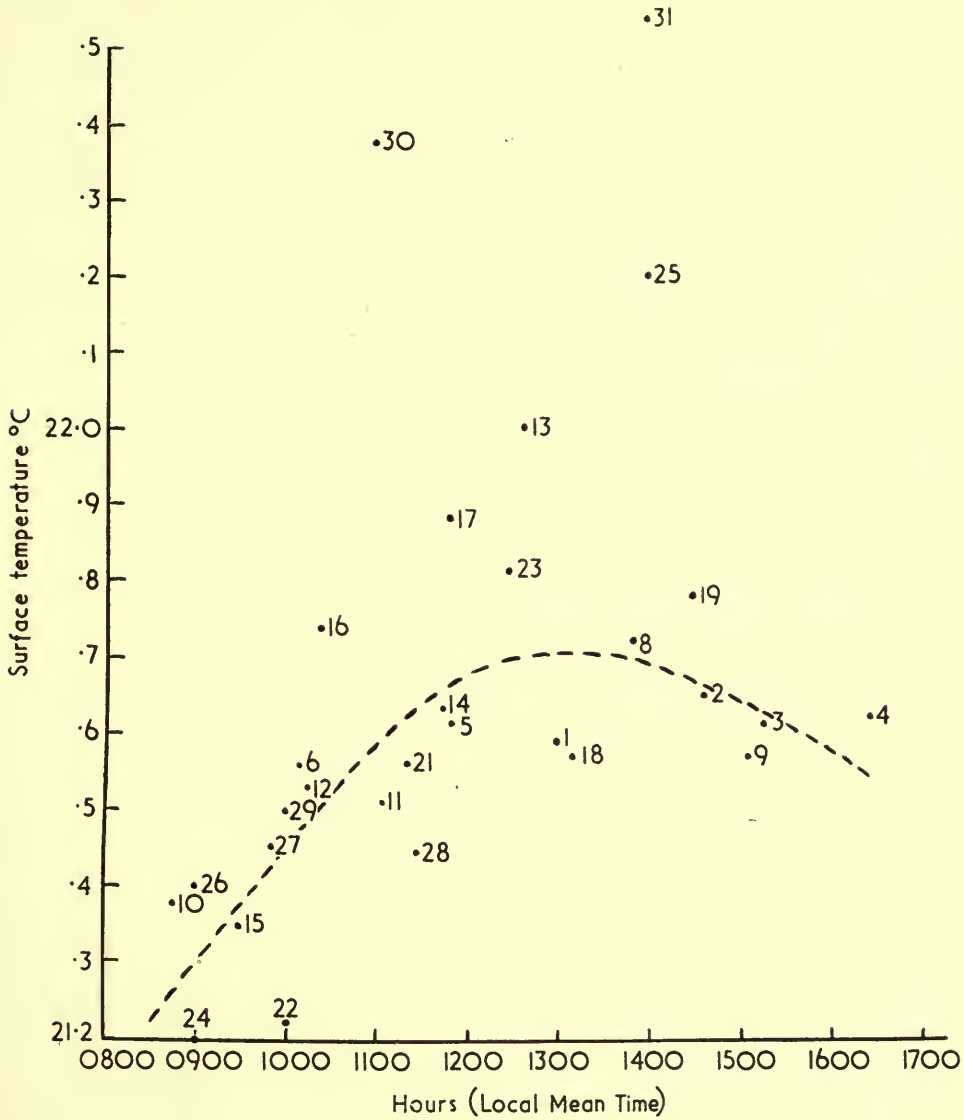


FIG. 2. Surface temperature in relation to time of day. (Numbers refer to stations.)

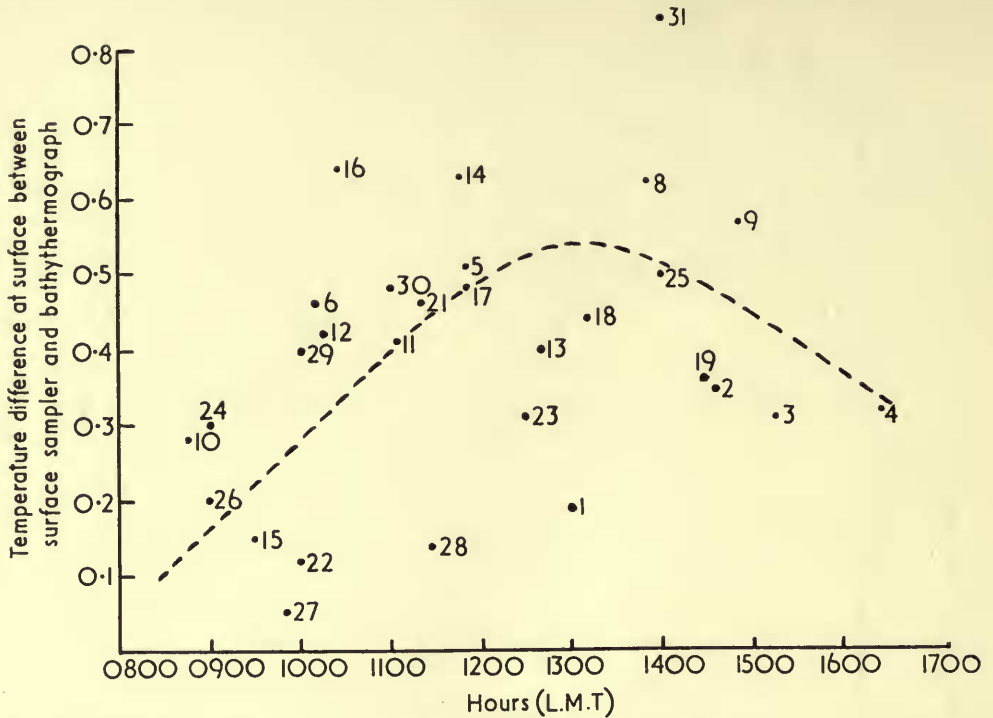


FIG. 3. Difference of temperature between surface samples and bathythermograph 'surface' recordings, plotted against time of day. (Numbers refer to stations.)

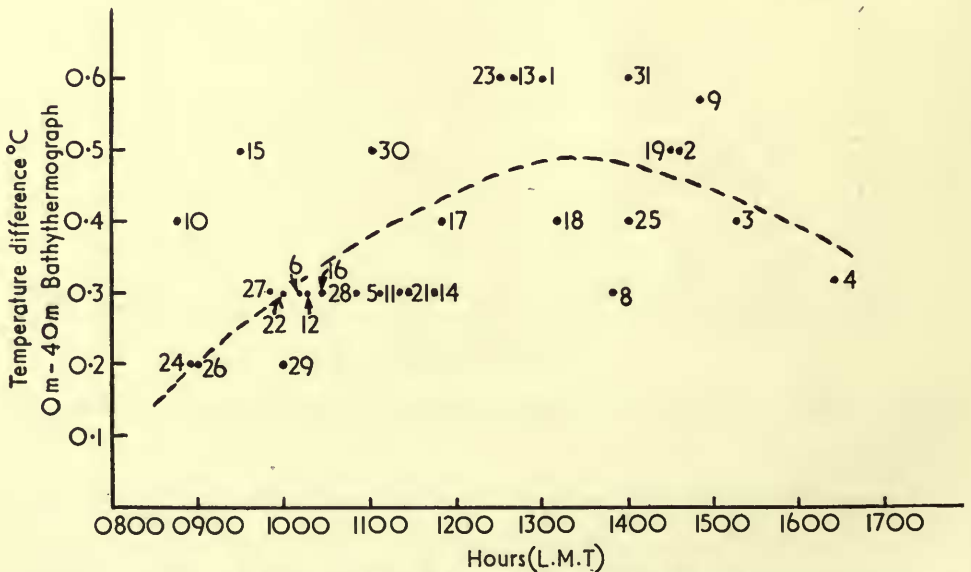


FIG. 4. Difference between temperature at surface and at 40 metres, plotted against time of day. (Numbers refer to stations.)